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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/626,828

07/25/2003

Masahiro Fujii

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EXAMINER

HYUN, PAUL SANG HWA

ART UNIT

PAPER NUMBER

1743

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/626,828	FUJII ET AL.	
	Examiner	Art Unit	
	Paul S. Hyun	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 3,4,7,13-17 and 22-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,6,8-12,18-21,25-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>7/25/03, 10/13/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

REMARKS

Claims 1-27 are currently pending. In response to a written election of species requirement mailed on 04/18/06, Applicants elected the prosecution of claims 1, 2, 5, 6, 8-12, 18-22 and 25-27 without traverse. The non-elected claims are subject to rejoinder if the generic claims are deemed allowable.

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because the Abstract exceeds 150 words. Correction is required. See MPEP § 608.01(b).

Claim 2 is objected to because of the following informalities:

The comma placed in line 5 of the claim should be deleted.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 11 and 12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The Specification defines "synthesized current" as drive current obtained upon applying the drive voltage pulse to all the nozzles simultaneously (see [0088]). It is not clear how the control means can select the defective nozzle to be replaced if a synthesized current is used as the discrimination means. Measuring the synthesized current would detect the presence of a defective discharge, but it would not be able to identify the defective nozzle. It appears that the drive current of the nozzles must be measured individually in order for the control means to distinguish the defective nozzle(s) from the functional nozzles.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Purcell et al. (US 6,347,857 B1).

Purcell et al. disclose a dispensing device comprising a plurality of nozzles, a discrimination means for discriminating the existence of a defective nozzles, and a control means for allocating the duties of a defective nozzles to a neighboring functional nozzles (see lines 54-62, col. 2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes et al. (US 4,877,745) in view of Purcell et al. (US 6,347,857 B1).

Hayes et al. disclose a piezoelectric dispenser. The dispenser comprises a plurality of jetting heads for discharging a biological solution contained therein (see claim 4). However, the reference does not disclose a discrimination means or a control means as recited in the claim.

Purcell et al. disclose a dispensing device comprising a plurality of jet heads, a discrimination means for discriminating the existence of a defective jet head, and a control means for performing a discharge using a functional jet head in place of the defective jet head (see lines 54-62, col. 2). The reference also discloses a means for

recovering the defective jet head to a fully functional state (see line 57, col. 13 – line 8, col. 14).

It would have been obvious to one of ordinary skill in the art to provide the apparatus disclosed by Hayes et al. with a discrimination means and a control means as taught by Purcell et al. so that high-quality microarrays can be formed despite the existence of defective jetting heads.

In regards to claims 20 and 21, it is well-known in the art to form microarrays of proteins and nucleic acids. Given that the apparatus disclosed by Hayes et al. is adapted to dispense biological solutions, it would have been obvious to one of ordinary skill in the art to dispense protein and nucleic acid solutions to form microarrays of proteins and nucleic acids using the modified Hayes et al. device.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes et al. in view of Purcell et al. as applied to claim 18, and further in view of Terasawa (US 4,631,554).

The dispensing device of claim 18 is unpatentable over Hayes et al. in view of Purcell et al. as discussed above, but the references do not disclose a recovery means comprising a suction that removes the solution to be dispensed from the nozzle.

Terasawa (US 4,631,554) discloses an ink jet printing apparatus comprising a suction recovery unit (see lines 20-65, col. 2). The recovery unit comprises a suction pump 7 adapted to draw bubbles, excess ink and excess air from the nozzle of the apparatus in order to recover the defective nozzles to a functional state.

In light of the teachings of Terasawa, it would have been obvious to one of ordinary skill in the art to provide a suction to the modified Hayes et al. apparatus so that excess fluid and bubbles can be removed from the nozzles of the apparatus.

Claims 2, 8-10, 22, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. (US 5,563,634) in view of Hayes et al., Watanabe (US 4,484,199) and Purcell et al.

Fujii et al. disclose an ink jet head drive apparatus comprising an electrode substrate 2 having a plurality of electrodes 21 formed in correspondence with a plurality of pressurized chambers 6 bounded by a diaphragm 5 and a chamber substrate 1 that faces the electrode substrate 2. The apparatus further comprises a drive circuit 102 for applying a voltage between the diaphragm and the electrodes in order to discharge ink from the nozzle 4 of the ink jet head (see Fig. 2). The apparatus disclosed by Fujii et al. differs from the claimed invention in that the reference does not disclose a drive current detection means, a discrimination means for detecting a defective discharge, or a control means for replacing the defective nozzle with a functional nozzle. The reference also does not disclose that the apparatus discharges biological samples.

In regards to the discharging of biological solutions, it is well-known in the art to dispense biological samples using a jet head apparatus to form microarrays. Hayes et al. disclose a piezoelectric dispenser comprising a plurality of jetting heads 400 adapted to dispense biological solutions to form a microarray (see claim 4).

In light of the teachings of Hayes et al., it would have been obvious to one of ordinary skill in the art to provide and dispense biological solutions to form microarrays using the apparatus disclosed by Fujii et al.

In regards to the drive current detection circuit and the discrimination means, Watanabe discloses a discrimination means for detecting defective discharge of nozzles of ink-jet recording devices. The discrimination means comprises a driving circuit that applies a drive voltage having a prescribed waveform to the nozzle, and a detection circuit for detecting the waveform of the current when an ink droplet is discharged. The discrimination means detects a defective discharge by comparing the detected waveform to the waveform of a successful discharge (see line 57, col. 3- line 9, col. 4).

In light of the teachings of Watanabe, it would have been obvious to one of ordinary skill in the art to provide the modified Fujii et al. apparatus with a detection circuit to analyze the waveform of the current flowing through each jetting head in order to detect any malfunctioning jetting head. Although the discrimination means disclosed by Watanabe detects voltage waveform instead of current waveform, given that voltage and current are positively correlated, it is inherent that the discrimination means is indirectly detecting current as well.

In regards to the control means, Purcell et al. disclose a dispensing device comprising a plurality of jet heads, a discrimination means for discriminating the existence of a defective jet head, and a control means for performing a discharge using a functional jet head in place of the defective jet head (see lines 54-62, col. 2).

In light of the teachings of Purcell et al., it would have been obvious to one of ordinary skill in the art to provide the modified Fujii et al. apparatus with a control means that replaces a defective nozzle with a fully functional nozzle so that the dispensing is not impaired by a malfunctioning jet head.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Hayes et al., Watanabe and Purcell et al. as applied to claim 2, and further in view of Ward et al. (US 6,640,621 B2).

Fujii et al. in view of Hayes et al., Watanabe and Purcell et al. disclose the apparatus of claim 2 as discussed above, but the references do not disclose a discrimination means that detects the existence of a defective discharge based on a differential waveform of the drive current.

Ward et al. disclose a sensor that analyzes differential waveforms of signals to identify defective signals. The reference discloses that the derivative of a waveform can indicate significant deviations from a normal signal (see lines 58-60, col. 1 and lines 7-9, col. 35). In light of the teachings of Ward et al., it would have been obvious to one of ordinary skill in the art to provide a means that differentiates the waveforms produced by the nozzles of the modified Fujii et al. apparatus in order to easily identify the abnormal waveforms produced by a defective nozzle.

In regards to claim 6, it appears that any differential waveform that deviates from a normal differential waveform can be considered an indication of a defective nozzle. Although the references do not disclose a discrimination means that indicates the

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existence of a defective discharge based on a peak waveform appearing on the positive side two consecutive times, it would have been obvious to one of ordinary skill in the art to provide a discrimination means that indicates a defective nozzle when it detects a differential waveform signal that deviates from the normal differential waveform signal, including a differential waveform signal comprising consecutive positive peak values.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. (US 5,563,634) in view of Hayes et al., Watanabe and Purcell et al. as applied to claim 26, and further in view of Wagner et al. (US 6,329,209 B1).

Fujii et al. in view of Hayes et al., Watanabe and Purcell et al. disclose the method of claim 26, but the references do not disclose dispensing protein solutions on a substrate to form a protein chip. However, Wagner et al. disclose a method of forming protein chips using ink-jet printer heads (see lines 10-35, col. 23).

In light of the teachings of Wagner et al., it would have been obvious to one of ordinary skill in the art to form protein chips useful for assays using the modified Fujii et al. device.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul S. Hyun whose telephone number is (571)-272-8559. The examiner can normally be reached on Monday-Friday 8AM-4:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PSH
5/22/06


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